

## C22C

**ALLOYS** (flints [C06C 15/00](#); treatment of alloys [C21D](#), [C22F](#))

### Definition statement

*This place covers:*

Ferrous and non ferrous alloys, radioactive alloys, amorphous alloys, alloys containing fibres or filaments.

It covers also cermets, master alloys, metal matrix composites, methods of making amorphous alloys as well as methods of making alloys by melting, by powder metallurgy, by removing material from alloys to produce alloys of different constitution.

Therefore, the term "alloys" includes:

- a) metallic composite materials containing a substantial proportion of fibres or other somewhat larger particles;
- b) ceramic compositions containing free metal bonded to carbides, diamond, oxides, borides, nitrides or silicides, e.g. cermets, or other metal compounds, e.g. oxynitrides or sulfides, other than as macroscopic reinforcing agents.

### Relationships with other classification places

When the alloy is produced by a specifically described method (examples, claims) then the method is classified as well ([C22F](#), [C21D](#), [B22F](#), [C23C](#), [B23K](#), [C25D](#), [C25B](#), [B22D](#), [B21J](#), [B21B](#), [B21C](#), etc).

When the alloy is intended for a particular use/product then the use/ product is classified as well (see informative references for some of them).

### References

#### Limiting references

*This place does not cover:*

Working metallic powder, powder metallurgical apparatus or processes	<a href="#">B22F</a>
Alloys based on non-metals (such as B, Si, Se, Te- based alloys etc.)	<a href="#">C01B</a> , <a href="#">C01D</a> , <a href="#">C01G</a>
Ceramics	<a href="#">C04B</a>
Changing the physical structure of ferrous alloys	<a href="#">C21D</a>
Changing the physical structure of non ferrous metals/alloys	<a href="#">C22F 1/00</a>

#### Informative references

*Attention is drawn to the following places, which may be of interest for search:*

Jewellery	<a href="#">A44C 27/00</a>
Biomedical applications, stents	<a href="#">A61F</a> , <a href="#">A61L</a>
Dental alloys	<a href="#">A61K</a>
Catalysts	<a href="#">B01J</a>
Soldering/welding (materials)	<a href="#">B23K</a> , <a href="#">B23K 35/00</a>
Layered products	<a href="#">B32B</a>
Lithographic printing plates	<a href="#">B41N</a>
Refining of metals	<a href="#">C22B</a>

Coating/Sputtering targets	<a href="#">C23C/ C23C 14/00</a>
Electrolytic production or refining of metals	<a href="#">C25C</a>
Single crystals	<a href="#">C30B</a>
Steam turbines, turbine rotors blades, turbine blades	<a href="#">F01D</a> , <a href="#">F01D 5/00</a>
Valve guides/valve seat inserts	<a href="#">F01L</a>
Gas turbine plants	<a href="#">F02C</a>
Bearings, shafts/crankshafts	<a href="#">F16C</a> , <a href="#">F16C 23/00</a>
Springs	<a href="#">F16F</a>
Sliding members	<a href="#">F16J</a> , <a href="#">F16K</a>
Heat exchangers	<a href="#">F28F</a>
Armour constructions/plates	<a href="#">F41H</a>
Magnetic head applications	<a href="#">G11B 5/31</a>
Magnetic alloy thin films (such as used in magnetoresistive applications in magnetic heads)	<a href="#">G11B 5/39</a>
Magnetic alloy thin films (such as used in magnetic thin film media applications)	<a href="#">G11B 5/64</a>
Magnetic alloy thin films (such as used in static memory applications)	<a href="#">G11C 11/00</a>
Nuclear reactors/reactor fuel elements	<a href="#">G21C</a> , <a href="#">G21C 3/04</a>
Electrical wires	<a href="#">H01B</a>
Magnets	<a href="#">H01F</a>
Contacts	<a href="#">H01H</a>
Shadow masks	<a href="#">H01J</a>
Semiconductor devices/detailsBonding wires, lead frames	<a href="#">H01L</a>
Batteries/fuel cells	<a href="#">H01M</a>
Electrical connectors	<a href="#">H01R</a>
Electronic components	<a href="#">H05K</a>

### Special rules of classification

The phrase "based on" means in general at least 50% by weight of the specified constituent or of the specified group of constituents.

The base of the alloy in a broader sense is interpreted as the metallic element which is the major constituent of the alloy, whether the content of that element is more or less than 50 wt%. For example in an alloy with Ni 40 wt%, Fe 30 wt% Co 30 wt%, the base of the alloy is Ni.

It is possible for an alloy to have more than one base major constituent.

When the alloy contains less than 50 wt% of each constituent, i.e. alloy with more than one base, then in addition to the [C22C](#) corresponding to the major constituent(s) at least one [C22C 30/00](#) class is also given depending on the rest of the main alloying elements.

In [C22C 5/00-C22C 30/00](#), [C22C 37/00-C22C 45/00](#), [C22C](#) classes are given for both inventive and additionally disclosed alloys, whether in the claims, description, figures or inventive examples

The compositions of amorphous alloys are classified in [C22C 45/00](#). The methods of making Fe-based amorphous alloys are classified in [C22C 33/003](#). The methods of making amorphous alloys (other

than Fe-based ones) are classified in [C22C 1/002](#). Semi-amorphous alloys are classified both as amorphous and as crystalline ones ([C22C 45/00](#) and [C22C 5/00-C22C 38/00](#)). The compositions of cast-iron alloys are classified in [C22C 37/00](#). The methods of making cast-iron alloys are classified in [C22C 33/08-C22C 33/12](#).

Alloys based on a metal not provided for in the groups [C22C 5/00- C22C 45/10](#) e.g. Ga-based, In-based alloys etc. are classified in [C22C 28/00](#).

In the groups [C22C 5/00-C22C 30/00](#), [C22C 37/00-C22C 45/00](#), the last place rule is followed (classification in the last appropriate place) combined with multiple classifications, for a classification of a 100% disclosed alloy composition.

In this subclass a computerised search system is available for online searching via the database "Alloys" of EPOQUE. This system, used as a search aid, contains all patent documents classified in groups [C22C 1/04](#) and [C22C 5/00 - C22C 49/14](#) and provides information on the composition of the alloys, their uses and characteristics.

The alloy composition(s) is/are indexed in the Alloys database and different records are created for all disclosed alloy composition on the basis of:

a) the claims taken in combination with the description of the application as well as b) the inventive examples (individual examples, tables). In this case fictive elemental ranges are created with lower limits and upper limits as disclosed in the inventive examples disclosed in the table(s).

Rules for indexing compositions, composites and layers in [C22C](#) and [B22](#):

Classes: [C22C 1/04+](#), [C22C 1/05+](#), [C22C 1/09+](#), [C22C 1/10+](#), [C22C 26/00+](#), [C22C 29/00+](#), [C22C 32/00+](#), [C22C 33/02+](#), [B22F](#).

Indexed are the claims, usually not the entire document.

In case the claims are rather broad, examples are being indexed.

As a rule only the end products are indexed, not disclosed method or intermediates products.

However, if those methods or intermediate products are significant, they may be indexed as well.

The word "particles" used throughout this document covers both powder and fibre (or other geometrical) forms, unless indicated specifically otherwise.

Particles and mixtures of particles are indexed only by a combination of Indexing-codes which form a string. Specific compositions (by specific ranges) are also classified in the Alloys database of EPOQUE. If the particles are processed into a product having a specific composition, that is one with specific ranges, then the document should be classified in the corresponding [C22C](#) class. If the composition is not specific and different from the original particle composition (e.g. due to mixing or reaction with other materials during processing) then this should be indexed by an Indexing Code-string.

Definitions:

- Non-metals are, according to the IPC: B C H N O P S Se Si Te, noble gases, halogens.

Metals: elements other than non-metals.

- Metal compounds include: borides, carbide, hydrides, nitrides, oxides, sulfides, silicides, selenides, tellurides, carbonitrides.

Note: a silicide, selenide or telluride is not an intermetallic according to our coding, even though much scientific literature designates them as such.

- Intermetallic compounds (IM) and complex compounds:

A constituent out of an intermetallic or a complex compound is described in one string with the other constituents.

E.g. a Ni alloy with Co which includes an IM out of Al and Ti.

[B22F 2303/01](#), [B22F 2301/15](#), [B22F 2303/10](#), [B22F 2301/15](#), [B22F 2303/15](#);

[B22F 2303/15](#), [B22F 2301/052](#), [B22F 2301/205](#);

E.g. a Ni alloy with an IM of Al and Ni and Potassium aluminate

[B22F 2303/01](#), [B22F 2301/15](#), [B22F 2303/10](#), [B22F 2303/15](#), [B22F 2302/35](#);

[B22F 2303/15](#), [B22F 2301/052](#), [B22F 2301/15](#);

[B22F 2302/35](#), [B22F 2302/25](#), [B22F 2301/052](#), [B22F 2301/054](#);

An IM and a complex oxide in sequence is also possible.

- Complex borides, carbides, nitrides, oxides, silicides, sulfides, carbonitrides, carboxides:

A complex compound as above comprises two or more metallic elements with a non-metallic element(s).

The indexing follows the same rules as for IM (intermetallic)

e.g.: an Al alloy which includes a complex carbide comprising Mo and W:

[B22F 2303/01](#), [B22F 2302/35](#);

[B22F 2302/35](#), [B22F 2302/10](#), [B22F 2301/20](#);

or which includes a complex boride comprising Ti and Zr:

[B22F 2303/01](#), [B22F 2302/35](#);

[B22F 2302/35](#), [B22F 2302/05](#), [B22F 2301/205](#) ;

or which includes a complex carbonitride comprising Ta and Ti:

[B22F 2303/01](#), [B22F 2302/35](#);

[B22F 2302/35](#), [B22F 2302/15](#), [B22F 2301/20](#), [B22F 2301/205](#);

- Aluminates, borates, carbonates, nitrates, phosphates, silicates and sulphates are not indexed as complex oxides but indicated as "other". They should be retrieved by full text search.
- Carbon, graphite, diamond and carbon nanotubes are separately indexed as well.

e.g. carbon nanotubes coated with iron

[B22F 2302/403](#), [B22F 1/025](#), [B22F 2301/35](#)

or an iron particle coated with carbon nanotubes

[B22F 2301/35](#), [B22F 1/02](#), [B22F 2302/403](#)

Classification aspects:

The alloying elements of the particle, fibre, mix or layer can be disclosed either as obligatory or as optional. These codes can be connected with other code words like "coating alloy".

The elements are listed according to their wt%.: highest weight first, for a range the lowest limit of that range. If not specified: alphabetically.

The main component is not necessarily over 50%. If more elements can be the main component, they are listed in sequence. When some of the elements could be an alloying element as well, they must be repeated in a sentence with alloy.

A coating is used only for material that covers the surface of a particle or fibre. It is indexed by including the corresponding class ([B22F 1/02](#) or [B22F 1/025](#)) followed by the elements/components making up the coating (see example above).

If multiple coatings are applied the corresponding class is repeated within the string.

When the coating is formed of individual particles or fibres, then the appropriate Indexing Code is indicated in the string as well.

For fibres the corresponding class ([B22F 1/0025](#) or [B22F 1/004](#)) is put in the string.

A molten metal infiltrating a metal preform will be indicated in addition to the overall composition.

note: when molten metal infiltrates a preform out of ceramic material, not being fibre, the ceramic material is described as a compulsory alloy component with the metal as the main component (or vice versa in case of a cermet being formed).

Each layer in a layered product is indexed in a separate string. When one of the layers has the function of a support layer and which is not made by powder metallurgy, this is indicated as "support layer" together with the layer composition to which it is attached.

e.g. a layered product comprising two layers formed by powder metallurgy on top of a cast metal support: A first layer of Al, a second layer of an Al alloy having 4 compulsory alloy components and optionally carbides, oxides or nitrides as alloying components, supported by a steel sheet (not made by powder metallurgy).

[B22F 2303/40](#), [B22F 2301/052](#);

[B22F 2303/40](#), [B22F 2301/052](#), [B22F 2303/05](#), [B22F 2301/10](#), [B22F 2301/20](#),  
[B22F 2302/40](#)+[B22F 2302/45](#), [B22F 2303/10](#), [B22F 2302/105](#), [B22F 2302/253](#), [B22F 2302/10](#),  
[B22F 2302/20](#)+[B22F 2302/205](#), [B22F 2303/405](#), [B22F 2301/35](#), [B22F 2303/05](#), [B22F 2302/40](#);

When a mixture of metal or non-metallic (compounds) forms a final composition which is not the aggregate of the "ingredients", the composition of the different parts of the mixture is indexed. Each new mixture is in a different paragraph. The coding is likely to occur in the classes [C22C 33/0207](#)-[C22C 33/0228](#) and class [B22F 1/0003](#).

e.g. A mixture of two powders is isostatically pressed and sintered.

One powder consists of tungsten carbide with 5% of a Co binder, alloyed with Ni.

Its size is from 10 to 50 micron. This powder constitutes the major part of the mixture.

The second powder consists mainly of zirconium oxide and some aluminium-phosphate. Its size is more than 100 microns.

This gives the following indexing:

[B22F 2303/45](#), [C22C 29/08](#), [B22F 2303/05](#), [B22F 2301/15](#), [B22F 2304/10](#);

[B22F 2303/45](#), [B22F 2302/25](#), [B22F 2302/45](#), [B22F 2304/10](#), [B22F 2304/15](#);

The size of the used powders may be of interest. If this is claimed or given as extra information in the text, the size "range" is indicated to avoid/surpass different nomenclature.

## Glossary of terms

*In this place, the following terms or expressions are used with the meaning indicated:*

Alloy	A composition of plural elements at least one of which is a free metal. It also includes material containing any combination of fibres, filaments, whiskers and particles, e.g. carbides, diamond, oxides, borides, nitrides, silicides, or other metal compounds, e.g. oxynitrides or sulfides embedded in a metallic matrix
Base / Based on	at least 50% by weight of the specified constituent or of the specified group of constituents, or the metallic element which is the largest constituent of the alloy.
Amorphous	Possessing no regular crystalline arrangement of atoms.
Cermet	Material containing any combination of fibres, filaments, whiskers and particles, e.g. carbides, diamond, oxides, borides, nitrides, silicides, or other metal compounds, e.g. oxynitrides or sulfides embedded in a metallic matrix.
Master alloy	A mixture or alloy of elements which are to be added to a charge or molten metal in order to provide a desired composition, deoxidize the molten metal or provide a fine grain size etc.
Refining	Purification of metal by removing impurities therefrom.

## C22C 1/00

**Making alloys (powder-metallurgical apparatus or processes, not specially modified for making alloys [B22F](#); by electrothermal methods [C22B 4/00](#); by electrolysis [C25C](#))**

### Definition statement

*This place covers:*

methods for making alloys which are not covered in any of [B22F](#), [C22B](#), [C25C](#), [C22F](#), [C21D](#).

### References

#### Limiting references

*This place does not cover:*

Methods of making alloys by powder metallurgy	<a href="#">B22F</a>
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#### Informative references

*Attention is drawn to the following places, which may be of interest for search:*

Alloy compositions	<a href="#">C22C 5/00</a> - <a href="#">C22C 45/00</a> , <a href="#">C04B 41/51</a>
Methods of making ferrous amorphous alloys	<a href="#">C22C 33/003</a>
Changing the physical structure of ferrous metals/alloys	<a href="#">C21D</a>
Changing the physical structure of non-ferrous metals/alloys	<a href="#">C22F</a>

### Special rules of classification

In these groups, the last place rule is followed combined with multiple classifications.

In [C22C 1/002](#) are classified methods of making non-ferrous amorphous alloys.

## C22C 1/04

by powder metallurgy ([C22C 1/08](#), {[C22C 1/05](#), [C22C 1/10](#), [C22C 32/00](#), [C22C 47/00](#), [C22C 49/00](#)} take precedence)

### Definition statement

*This place covers:*

non-ferrous alloys made by powder metallurgy containing only metallic or intermetallic constituents

### Relationships with other classification places

[B22F](#) covers the processes of treating the powders, making workpieces or articles therefrom or processes for making the powders and their characteristics.

### References

#### Limiting references

*This place does not cover:*

Ferrous or non-ferrous alloys containing metal or non-metallic compounds or fibers or filaments	<a href="#">C22C 1/10</a> , <a href="#">C22C 26/00</a> , <a href="#">C22C 29/00</a> , <a href="#">C22C 32/00</a> , <a href="#">C22C 47/00</a> or <a href="#">C22C 49/00</a>
Rods, electrodes, materials or media, for use in soldering, welding or cutting	<a href="#">B23K 35/00</a>
Selenium, Tellurium; compounds thereof	<a href="#">C01B 19/00</a>
Silicon, compounds thereof	<a href="#">C01B 33/02</a>
Ceramic products containing shaped metallic materials	<a href="#">C04B 35/74</a>
Electrolytic production or refining of metals	<a href="#">C25C</a>
Single crystals or homogeneous polycrystalline material with defined structure, e.g. directionally solidified	<a href="#">C30B 29/00</a>
Magnets	<a href="#">H01F</a>

#### Informative references

*Attention is drawn to the following places, which may be of interest for search:*

Flints	<a href="#">C06C 15/00</a>
Processing of pig iron, e.g. refining, manufacture of wrought iron or steel	<a href="#">C21C</a>
Coating material with metallic material; cementation (carburizing, nitriding, etc.) processes	<a href="#">C23C</a>
Metals for projectiles	<a href="#">F42B 12/72</a> - <a href="#">F42B 12/745</a>
Metallic powders for capacitors	<a href="#">H01G 9/0525</a>

### Special rules of classification

The alloys are classified according to their main component in one of the subgroups [C22C 1/0408](#) - [C22C 1/0491](#):

[C22C 1/0408](#): alkali, alkaline earth, Be, Mg, Al (when not specific)

[C22C 1/0416](#): Al, when specific

[C22C 1/0425](#): Cu

[C22C 1/0433](#): Ni or Co

[C22C 1/0441](#): Ni or Co including intermetallic compounds of RE-type

[C22C 1/045](#): V Cr Nb Mo Ta W Re (Ti Zr Hf when not specific)

[C22C 1/0458](#): Ti Zr Hf when specific

[C22C 1/0466](#): Ag Au Os Ir Pt Ru Rh Pd

[C22C 1/0475](#): impregnated alloys

[C22C 1/0491](#): comprising intermetallic compounds

When the composition of a product is expressed in ranges and is the basis of the invention or when specific examples are given in the description, the composition, respectively the examples, should also be classified in the database Alloys. In case the composition is expressed in general terms or is not the basis of the invention, the composition is indexed by deep-indexing according to the scheme of [B22F](#) and in accordance with the rules presented in the annex.

- low melting point metals are: Zn Pb Sn Cd In Ga

## C22C 1/05

**Mixtures of metal powder with non-metallic powder ([C22C 1/08](#), {[C22C 47/00](#), [C22C 49/00](#)} take precedence)**

### Definition statement

*This place covers:*

dry processes for making cermets (i.e. more than 50wt% metal or non-metallic compounds)

### References

#### Informative references

*Attention is drawn to the following places, which may be of interest for search:*

Composition of cermets	<a href="#">C22C 29/00</a>
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### Special rules of classification

When specific processes or process steps are applied that are used in powder metallurgy and not covered by any of the [C22C 1/05](#) subgroups, the corresponding [B22F](#) class is given either as an EC or an Indexing Code.

e.g. if a powder mixture of metal and metal compounds is CIPressed, reaction sintered and subsequently forged :

EC : [C22C 1/058](#)

Indexing Code: [B22F 2998/10](#), [B22F 3/04](#), [C22C 1/058](#), [B22F 3/17](#)

When the composition of a product is expressed in ranges and is the basis of the invention or when specific examples are given in the description, the composition, respectively the examples, should also

be classified in the database Alloys. When the composition is expressed in general terms or is not the basis of the invention, the composition is indexed by deep-indexing according to the scheme of [B22F](#) and in accordance with the rules presented in the annex.

## C22C 1/08

**Alloys with open or closed pores {(by powder metallurgy [B22F 3/11](#))}**

### Definition statement

*This place covers:*

also porous products obtained by processes involving a molten metal bath

### References

#### Informative references

*Attention is drawn to the following places, which may be of interest for search:*

Casting metal foams	<a href="#">B22D 25/005</a>
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### Special rules of classification

The process is classified by means of Indexing Codes or classes belonging to the subgroup [B22F 3/11](#).

When the composition of a product is expressed in ranges and is the basis of the invention or when specific examples are given in the description, the composition, respectively the examples, should also be classified in the database Alloys. When the composition is expressed in general terms or is not the basis of the invention, the composition is indexed by deep-indexing according to the scheme of [B22F](#) and in accordance with the rules presented in the annex.

## C22C 1/10

**Alloys containing non-metals ({[C22C 1/05](#)}, [C22C 1/08](#), {[C22C 47/00](#), [C22C 49/00](#)} take precedence)**

### Definition statement

*This place covers:*

Processes for making alloys containing metal or non-metallic compounds wherein the metal is the major constituent. The processes cover both wet and dry processes as well as pre-treatments of the added compounds and after-treatments.

### References

#### Limiting references

*This place does not cover:*

Processes for making cermets	<a href="#">C22C 1/05</a>
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#### Informative references

*Attention is drawn to the following places, which may be of interest for search:*

Infiltrating sintered metal powder article	<a href="#">B22F 3/26</a>
Infiltration of sintered ceramic preforms with molten metal	<a href="#">C04B 41/51</a>

## Special rules of classification

spray casting composite powder, including fibres : [C22C 1/1042](#)

When a filler material can only be of a fibrous nature, classification is made in group [C22C 47/00](#), [C22C 49/00](#). When the filler material is chosen from alternatives which can be fibrous or non-fibrous, classification is made in group [C22C 1/10](#). When both fibrous and non-fibrous fillers are present, classification is made in group [C22C 47/00](#), [C22C 49/00](#) and also in group [C22C 32/00](#) if the composition is of importance.

When the composition of a product is expressed in ranges and is the basis of the invention or when specific examples are given in the description, the composition, respectively the examples, should also be classified in the database Alloys. When the composition is expressed in general terms or is not the basis of the invention, the composition is indexed by deep-indexing according to the scheme of [B22F](#) and in accordance with the rules presented in the annex.

## C22C 3/00

### Removing material from alloys to produce alloys of different constitution {separation of the constituents of alloys}

#### Definition statement

*This place covers:*

methods of separation of constituents of alloys such as purification, recovery, removing of undesirable material(s) etc.

#### References

##### Informative references

*Attention is drawn to the following places, which may be of interest for search:*

Alloy compositions	<a href="#">C22C 5/00</a> - <a href="#">C22C 45/00</a>
Alloys based on mercury	<a href="#">C22C 7/00</a>
Refining of metals	<a href="#">C22B</a>

## Special rules of classification

In these groups, the last place rule is followed combined with multiple classifications.

## C22C 5/00

### Alloys based on noble metals

#### Definition statement

*This place covers:*

Noble metal based alloys i.e. with the noble metal (Ag, Au, platinum group) as the major constituent i.e. the base of the alloy.

#### Relationships with other classification places

When the alloy is produced by a specifically described method (examples, claims) then the method is classified as well ([C22F](#), [C23C](#), [C23D](#), [B23K](#), [C25B](#), [B22D](#), [C25D](#), [B21J](#), [B21B](#), [B21C](#) etc).

When the alloy is intended for a particular use/product then the use/ product is classified as well.

## References

### Limiting references

*This place does not cover:*

Amorphous alloys	<a href="#">C22C 45/003</a>
Laminates	<a href="#">B32B</a>
Magnetic media/head laminates	<a href="#">G11B</a>

### Informative references

*Attention is drawn to the following places, which may be of interest for search:*

Jewellery	<a href="#">A44C 27/00</a>
Dental alloys	<a href="#">A61K</a>
Catalysts	<a href="#">B01J</a>
Powder metallurgy	<a href="#">B22F</a> , <a href="#">C22C 1/04</a>
Soldering/welding materials	<a href="#">B23K 35/3006</a> , <a href="#">B23K 35/3013</a> , <a href="#">B23K 35/322</a>
Changing the physical structure of noble metals and alloys based thereon	<a href="#">C22F 1/14</a>

## Special rules of classification

In [C22C 5/06-C22C 5/10](#) the last place rule is followed combined with multiple classifications.

For example a silver alloy with Cu as the next major constituent is classified in [C22C 5/08](#) (last place rule).

When the alloy contains less than 50 wt% of each constituent, with a noble metal being a major constituent, then in addition to the corresponding [C22C 5/00](#) class at least one [C22C 30/00](#) class is also given depending on the rest of the main alloying elements.

For example for an alloy with 45-55 wt% Au, 35-45 wt% Cu and the rest other metallic constituents, both classes [C22C 5/02](#) and [C22C 30/02](#) are given.

The alloy composition(s) is/are indexed in the Alloys database.

## C22C 7/00

### Alloys based on mercury

#### Definition statement

*This place covers:*

Mercury based alloys i.e. with Hg as the major constituent i.e. the base of the alloy.

#### Relationships with other classification places

When the alloy is produced by a specifically described method (examples, claims) then the method is classified as well ([C22F](#), [C23C](#), [C23D](#), [B23K](#), [C25B](#), [B22D](#), [C25D](#), [B21J](#), [B21B](#), [B21C](#) etc).

When the alloy is intended for a particular use/product then the use/ product is classified as well.

## References

### Limiting references

*This place does not cover:*

Amorphous alloys	<a href="#">C22C 45/00</a>
Laminates	<a href="#">B32B</a>

### Informative references

*Attention is drawn to the following places, which may be of interest for search:*

Dental alloys	<a href="#">A61K</a>
Powder metallurgy	<a href="#">B22F</a> , <a href="#">C22C 1/04</a>
Changing the physical structure of non ferrous metals and alloys based thereon	<a href="#">C22F 1/16</a>

## Special rules of classification

When the alloy contains less than 50 wt% of each constituent, with Hg being a major constituent, then in addition to the [C22C 7/00](#) class at least one [C22C 30/00](#) class is also given depending on the rest of the main alloying elements.

The alloy composition(s) is/are indexed in the Alloys database.

## C22C 9/00

### Alloys based on copper

#### Definition statement

*This place covers:*

Copper metal based alloys i.e. with Cu as the major constituent i.e. the base of the alloy.

#### Relationships with other classification places

When the alloy is produced by a specifically described method (examples, claims) then the method is classified as well ([C22F](#), [C23C](#), [C23D](#), [B23K](#), [C25B](#), [B22D](#), [C25D](#), [B21J](#), [B21B](#), [B21C](#) etc).

When the alloy is intended for a particular use/product then the use/ product is classified as well.

## References

### Limiting references

*This place does not cover:*

Amorphous alloys	<a href="#">C22C 45/001</a>
Laminates	<a href="#">B32B</a>

### Informative references

*Attention is drawn to the following places, which may be of interest for search:*

Jewellery	<a href="#">A44C 27/00</a>
Biomedical applications, stents	<a href="#">A61F</a> , <a href="#">A61L</a>

Soldering/welding materials	<a href="#">B23K 35/302</a>
Changing the physical structure of copper or alloys based thereon	<a href="#">C22F 1/08</a>

### Special rules of classification

In these groups, the last place rule is followed combined with multiple classifications. Depending on the next major constituent to Cu, the corresponding [C22C 9/00](#) class(es) is/are given.

For example: in a Cu alloy consisting of 30 wt% Sn, 30 wt% Zn, the balance being Cu, both classes [C22C 9/02](#) and [C22C 9/04](#) are given.

When the alloy contains less than 50 wt% of each constituent, with Cu being a major constituent, then in addition to the corresponding [C22C 9/00](#) class the class [C22C 30/02](#) class is given and depending on the remaining main alloying elements [C22C 30/00](#) and/or [C22C 30/04](#) and/or [C22C 30/06](#) may also be given.

The alloy composition(s) is/are indexed in the Alloys database.

## C22C 11/00

### Alloys based on lead

#### Definition statement

*This place covers:*

Lead based alloys i.e. with Pb as the major constituent i.e. the base of the alloy.

#### Relationships with other classification places

When the alloy is produced by a specifically described method (examples, claims) then the method is classified as well ([C22F](#), [C21D](#), [B22F](#), [C23C](#), [B23K](#), [C25D](#), [C25B](#), [B22D](#), [B21J](#), [B21B](#), [B21C](#) etc).

When the alloy is intended for a particular use/product then the use/ product is classified as well.

#### References

##### Limiting references

*This place does not cover:*

Amorphous alloys	<a href="#">C22C 45/00</a>
Laminates	<a href="#">B32B</a>

##### Informative references

*Attention is drawn to the following places, which may be of interest for search:*

Soldering/welding materials	<a href="#">B23K 35/268</a>
Changing the physical structure of lead or alloys based thereon	<a href="#">C22F 1/12</a>

### Special rules of classification

In [C22C 11/08-C22C 11/10](#) the last place rule is followed combined with multiple classifications.

A lead alloy with Bi as the next major constituent and comprising Sn is classified in [C22C 11/10](#) (last place rule).

For example: in a Pb alloy consisting of 25 wt% Cu, 25 wt% Sn, the balance being Pb, both classes [C22C 11/04](#) and [C22C 11/06](#) are given.

When the alloy contains less than 50 wt% of each constituent, with Pb being a major constituent, then in addition to the corresponding [C22C 11/00](#) class the class [C22C 30/04](#) class is given and depending on the rest of the main alloying elements [C22C 30/00](#) and/or [C22C 30/02](#) and/or [C22C 30/06](#) may also be given.

The alloy composition(s) is/are indexed in the Alloys database.

## C22C 12/00

### Alloys based on antimony or bismuth

#### Definition statement

*This place covers:*

Antimony or bismuth based alloys i.e. with Sb or Bi as the major constituent i.e. the base of the alloy

#### Relationships with other classification places

When the alloy is produced by a specifically described method (examples, claims) then the method is classified as well ([C22F](#), [C21D](#), [B22F](#), [C23C](#), [B23K](#), [C25D](#), [C25B](#), [B22D](#), [B21J](#), [B21B](#), [B21C](#) etc).

When the alloy is intended for a particular use/product then the use/ product is classified as well.

#### References

##### Limiting references

*This place does not cover:*

Amorphous alloys	<a href="#">C22C 45/00</a>
Laminates	<a href="#">B32B</a>

##### Informative references

*Attention is drawn to the following places, which may be of interest for search:*

Soldering/welding materials	<a href="#">B23K 35/00</a> , <a href="#">B23K 35/264</a>
Changing the physical structure of antimony, bismuth or alloys based thereon	<a href="#">C22F 1/16</a>

### Special rules of classification

When the alloy contains less than 50 wt% of each constituent, with Sb or Bi being a major constituent, then in addition to the [C22C 12/00](#) class at least one [C22C 30/00](#) class is also given depending on the rest of the main alloying elements.

The alloy composition(s) is/are indexed in the Alloys database.

## C22C 13/00

### Alloys based on tin

#### Definition statement

*This place covers:*

Tin based alloys i.e. with Sn as the major constituent i.e. the base of the alloy

#### Relationships with other classification places

When the alloy is produced by a specifically described method (examples, claims) then the method is classified as well ([C22F](#), [C21D](#), [B22F](#), [C23C](#), [B23K](#), [C25D](#), [C25B](#), [B22D](#), [B21J](#), [B21B](#), [B21C](#) etc).

When the alloy is intended for a particular use/product then the use/ product is classified as well.

#### References

##### Limiting references

*This place does not cover:*

Amorphous alloys	<a href="#">C22C 45/00</a>
Laminates	<a href="#">B32B</a>

##### Informative references

*Attention is drawn to the following places, which may be of interest for search:*

Soldering/welding materials	<a href="#">B23K 35/262</a>
Changing the physical structure of tin or alloys based thereon	<a href="#">C22F 1/16</a>

#### Special rules of classification

In these groups, the last place rule is followed combined with multiple classifications.

A tin alloy with Bi as the next major constituent is classified in [C22C 13/02](#) (last place rule).

For example: in a Sn alloy consisting of 25 wt% Bi, 25 wt% Zn, the balance being Sn, both classes [C22C 13/00](#) and [C22C 13/02](#) are given.

When the alloy contains less than 50 wt% of each constituent, with Sn being a major constituent, then in addition to the corresponding [C22C 13/00](#) class the class [C22C 30/04](#) class is given and depending on the rest of the main alloying elements [C22C 30/00](#) and/or [C22C 30/02](#) and/or [C22C 30/06](#) may also be given.

The alloy composition(s) is/are indexed in the Alloys database.

## C22C 14/00

### Alloys based on titanium

#### Definition statement

*This place covers:*

Titanium based alloys i.e. with Ti as the major constituent i.e. the base of the alloy

## Relationships with other classification places

When the alloy is produced by a specifically described method (examples, claims) then the method is classified as well ([C22F](#), [C21D](#), [B22F](#), [C23C](#), [B23K](#), [C25D](#), [C25B](#), [B22D](#), [B21J](#), [B21B](#), [B21C](#) etc).

When the alloy is intended for a particular use/product then the use/product is classified as well.

## References

### Limiting references

*This place does not cover:*

Amorphous alloys	<a href="#">C22C 45/10</a>
Laminates	<a href="#">B32B</a>

### Informative references

*Attention is drawn to the following places, which may be of interest for search:*

Soldering/welding materials	<a href="#">B23K 35/325</a>
Changing the physical structure of titanium or alloys based thereon	<a href="#">C22F 1/183</a>

## Special rules of classification

When the alloy contains less than 50 wt% of each constituent, with Ti being a major constituent, then in addition to [C22C 14/00](#) class at least one [C22C 30/00](#) class is given depending on the rest of the main alloying element(s).

The alloy composition(s) is/are indexed in the Alloys database.

## C22C 16/00

### Alloys based on zirconium

#### Definition statement

*This place covers:*

Zirconium based alloys i.e. with Zr as the major constituent i.e. the base of the alloy

## Relationships with other classification places

When the alloy is produced by a specifically described method (examples, claims) then the method is classified as well ([C22F](#), [C21D](#), [B22F](#), [C23C](#), [B23K](#), [C25D](#), [C25B](#), [B22D](#), [B21J](#), [B21B](#), [B21C](#) etc).

When the alloy is intended for a particular use/product then the use/ product is classified as well.

## References

### Limiting references

*This place does not cover:*

Amorphous alloys	<a href="#">C22C 45/10</a>
Laminates	<a href="#">B32B</a>

**Informative references**

Attention is drawn to the following places, which may be of interest for search:

Soldering/welding materials	<a href="#">B23K 35/00</a>
Changing the physical structure of zirconium or alloys based thereon	<a href="#">C22F 1/186</a>

**Special rules of classification**

When the alloy contains less than 50 wt% of each constituent, with Zr being a major constituent, then in addition to [C22C 16/00](#) class at least one [C22C 30/00](#) class is given depending on the rest of the main alloying element(s).

The alloy composition(s) is/are indexed in the Alloys database.

**C22C 18/00****Alloys based on zinc****Definition statement**

*This place covers:*

Zinc based alloys i.e. with Zn as the major constituent i.e. the base of the alloy

**Relationships with other classification places**

When the alloy is produced by a specifically described method (examples, claims) then the method is classified as well ([C22F](#), [C21D](#), [B22F](#), [C23C](#), [B23K](#), [C25D](#), [C25B](#), [B22D](#), [B21J](#), [B21B](#), [B21C](#) etc).

When the alloy is intended for a particular use/product then the use/ product is classified as well.

**References****Limiting references**

*This place does not cover:*

Amorphous alloys	<a href="#">C22C 45/00</a>
Laminates	<a href="#">B32B</a>

**Informative references**

Attention is drawn to the following places, which may be of interest for search:

Soldering/welding materials	<a href="#">B23K 35/282</a>
Changing the physical structure of zinc or alloys based thereon	<a href="#">C22F 1/165</a>

**Special rules of classification**

In these groups, the last place rule is followed combined with multiple classifications.

For example: in a Zn alloy consisting of 20 wt% Cu, 20 wt% Al, the balance being Zn, both classes [C22C 18/02](#) and [C22C 18/04](#) are given.

When the alloy contains less than 50 wt% of each constituent, with Zn being a major constituent, then in addition to the corresponding [C22C 18/00](#) class the class [C22C 30/06](#) class is given and depending on the rest of the main alloying elements [C22C 30/00](#) and/or [C22C 30/02](#) and/or [C22C 30/04](#) may also be given.

The alloy composition(s) is/are indexed in the Alloys database.

## C22C 19/00

### Alloys based on nickel or cobalt

#### Definition statement

*This place covers:*

Nickel or cobalt based alloys i.e. with Ni or Co as the major constituent i.e. the base of the alloy

#### Relationships with other classification places

When the alloy is produced by a specifically described method (examples, claims) then the method is classified as well ([C22F](#), [C21D](#), [B22F](#), [C23C](#), [B23K](#), [C25D](#), [C25B](#), [B22D](#), [B21J](#), [B21B](#), [B21C](#) etc).

When the alloy is intended for a particular use/product then the use/ product is classified as well.

#### References

##### Limiting references

*This place does not cover:*

Amorphous alloys	<a href="#">C22C 45/04</a> , <a href="#">C22C 45/008</a>
Laminates	<a href="#">B32B</a>
Magnetic media/MRAM/head laminates	<a href="#">G11B</a> , <a href="#">G11C</a>

##### Informative references

*Attention is drawn to the following places, which may be of interest for search:*

Soldering/welding materials	<a href="#">B23K 35/3033</a> , <a href="#">B23K 35/304</a> , <a href="#">B23K 35/3046</a>
Changing the physical structure of nickel or cobalt or alloys based thereon	<a href="#">C22F 1/10</a>

#### Special rules of classification

In these groups, the last place rule is followed combined with multiple classifications. In [C22C 19/05-C22C 19/058](#) multiple classes may be given for Ni-based alloys depending on the Cr content and the presence of Mo, W in it.

For example a nickel alloy with 8-32 wt% Cr comprising also Mo is classified in [C22C 19/057](#), [C22C 19/056](#), [C22C 19/055](#) and [C22C 19/053](#). Depending on the composition [C22C 19/002-C22C 19/007](#) may also be given.

Cobalt alloys are classified in [C22C 19/07](#). Depending on the composition [C22C 19/002-C22C 19/007](#) may also be given.

When the alloy contains less than 50 wt% of each constituent, with Ni or cobalt being a major constituent, then in addition to the corresponding [C22C 19/00](#) class at least one [C22C 30/00](#) class is also given depending on the rest of the main alloying elements.

The alloy composition(s) is/are indexed in the Alloys database.

## C22C 20/00

### Alloys based on cadmium

#### Definition statement

*This place covers:*

Cadmium based alloys i.e. with Cd as the major constituent i.e. the base of the alloy.

#### Relationships with other classification places

In an alloy consisting of 40-50 wt% Cd, 40-50 wt% Pb and the rest other metallic constituents, the classes [C22C 20/00](#) and [C22C 30/00](#) are given. (A class/at least one class is also given in [C22C 11/00](#) for the lead-base).

When the alloy is produced by a specifically described method (examples, claims) then the method is classified as well ([C22F](#), [C21D](#), [B22F](#), [C23C](#), [B23K](#), [C25D](#), [C25B](#), [B22D](#), [B21J](#), [B21B](#), [B21C](#) etc).

When the alloy is intended for a particular use/product then the use/ product is classified as well.

#### References

##### Limiting references

*This place does not cover:*

Amorphous alloys	<a href="#">C22C 45/00</a>
Laminates	<a href="#">B32B</a>

##### Informative references

*Attention is drawn to the following places, which may be of interest for search:*

Soldering/welding materials	<a href="#">B23K 35/266</a>
Changing the physical structure of cadmium or alloys based thereon	<a href="#">C22F 1/165</a>

#### Special rules of classification

When the alloy contains less than 50 wt% of each constituent, with Cd being a major constituent, then in addition to [C22C 20/00](#) class at least one [C22C 30/00](#) class is also given depending on the rest of the main alloying elements.

The alloy composition(s) is/are indexed in the Alloys database.

## C22C 21/00

### Alloys based on aluminium

#### Definition statement

*This place covers:*

Aluminium based alloys i.e. with Al as the major constituent i.e. the base of the alloy

#### Relationships with other classification places

When the alloy is produced by a specifically described method (examples, claims) then the method is classified as well ([C22F](#), [C21D](#), [B22F](#), [C23C](#), [B23K](#), [C25D](#), [C25B](#), [B22D](#), [B21J](#), [B21B](#), [B21C](#) etc).

When the alloy is intended for a particular use/product then the use/ product is classified as well.

## References

### Limiting references

*This place does not cover:*

Amorphous alloys	<a href="#">C22C 45/08</a>
Laminates	<a href="#">B32B</a>

### Informative references

*Attention is drawn to the following places, which may be of interest for search:*

Soldering/welding materials	<a href="#">B23K 35/286</a> , <a href="#">B23K 35/288</a>
Changing the physical structure of aluminium or alloys based thereon	<a href="#">C22F 1/04</a> - <a href="#">C22F 1/057</a>

## Special rules of classification

In these groups, the last place rule is followed combined with multiple classifications. Depending on the next major constituent to Al, the corresponding [C22C 21/00](#) class is given. In a case of more than one next major constituent(s), then more than one [C22C 21/00](#) classes are given.

An Al-alloy with Cu as the next major constituent comprising in addition Si, Mg and Zn as alloying elements is classified in [C22C 21/14](#), [C22C 21/16](#) and [C22C 21/18](#).

When the alloy contains less than 50 wt% of each constituent, with Al being a major constituent, then in addition to the corresponding [C22C 21/00](#) class at least one [C22C 30/00](#) class is also given depending on the remaining main alloying elements.

The alloy composition(s) is/are indexed in the Alloys database.

## C22C 22/00

### Alloys based on manganese

#### Definition statement

*This place covers:*

Manganese based alloys i.e. with Mn as the major constituent i.e. the base of the alloy

#### Relationships with other classification places

When the alloy is produced by a specifically described method (examples, claims) then the method is classified as well ([C22F](#), [C21D](#), [B22F](#), [C23C](#), [B23K](#), [C25D](#), [C25B](#), [B22D](#), [B21J](#), [B21B](#), [B21C](#) etc.

When the alloy is intended for a particular use/product then the use/ product is classified as well.

## References

### Limiting references

*This place does not cover:*

Amorphous alloys	<a href="#">C22C 45/00</a>
Laminates	<a href="#">B32B</a>

**Informative references**

Attention is drawn to the following places, which may be of interest for search:

Soldering/welding materials	<a href="#">B23K 35/3026</a>
Changing the physical structure of manganese or alloys based thereon	<a href="#">C22F 1/16</a>

**Special rules of classification**

When the alloy contains less than 50 wt% of each constituent, with Mn being a major constituent, then in addition to [C22C 22/00](#) class at least one [C22C 30/00](#) class is also given depending on the rest of the main alloying elements.

The alloy composition(s) is/are indexed in the Alloys database. examples/tables.

**C22C 23/00****Alloys based on magnesium****Definition statement**

*This place covers:*

Magnesium based alloys i.e. with Mg as the major constituent i.e. the base of the alloy.

**Relationships with other classification places**

When the alloy is produced by a specifically described method (examples, claims) then the method is classified as well ([C22F](#), [C21D](#), [B22F](#), [C23C](#), [B23K](#), [C25D](#), [C25B](#), [B22D](#), [B21J](#), [B21B](#), [B21C](#) etc).

When the alloy is intended for a particular use/product then the use/ product is classified as well.

**References****Limiting references**

*This place does not cover:*

Amorphous alloys	<a href="#">C22C 45/005</a>
Laminates	<a href="#">B32B</a>

**Informative references**

Attention is drawn to the following places, which may be of interest for search:

Soldering/welding materials	<a href="#">B23K 35/284</a>
Changing the physical structure of magnesium or alloys based thereon	<a href="#">C22F 1/06</a>

**Special rules of classification**

In these groups, the last place rule is followed combined with multiple classifications. Depending on the next major constituent to Mg, the corresponding [C22C 23/00](#) class is given. In a case of more than one next major constituent(s), then more than one [C22C 23/00](#) classes are given.

For example in a Mg alloy consisting of 20 wt% Zn, 20 wt% Al, the balance being Mg, both classes [C22C 23/02](#) and [C22C 23/04](#) are given.

When the alloy contains less than 50 wt% of each constituent, with Mg being a major constituent, then in addition to the corresponding [C22C 23/00](#) class at least one [C22C 30/00](#) class is also given depending on the rest of the main alloying elements.

The alloy composition(s) is/are indexed in the Alloys database.

## C22C 24/00

### Alloys based on an alkali or an alkaline earth metal

#### Definition statement

*This place covers:*

Alkali or alkaline earth metal based alloys i.e. with Li, Na, K, Rb, Cs, Fr, Ca, Sr, Ba, Ra as the major constituent i.e. the base of the alloy.

#### Relationships with other classification places

When the alloy is produced by a specifically described method (examples, claims) then the method is classified as well ([C22F](#), [C21D](#), [B22F](#), [C23C](#), [B23K](#), [C25D](#), [C25B](#), [B22D](#), [B21J](#), [B21B](#), [B21C](#) etc).

When the alloy is intended for a particular use/product then the use/ product is classified as well.

#### References

##### Limiting references

*This place does not cover:*

Amorphous alloys	<a href="#">C22C 45/00</a>
Laminates	<a href="#">B32B</a>

##### Informative references

*Attention is drawn to the following places, which may be of interest for search:*

Soldering/welding materials	<a href="#">B23K 35/00</a>
Changing the physical structure of alkali or alkaline earth metal or alloys based thereon	<a href="#">C22F</a>

#### Special rules of classification

When the alloy contains less than 50 wt% of each constituent, with an alkali or alkaline earth metal being a major constituent, then in addition to corresponding [C22C 24/00](#) class at least one [C22C 30/00](#) class is also given depending on the rest of the main alloying elements.

The alloy composition(s) is/are indexed in the Alloys database.

## C22C 25/00

### Alloys based on beryllium

#### Definition statement

*This place covers:*

Beryllium based alloys i.e. with Be as the major constituent i.e. the base of the alloy.

## Relationships with other classification places

When the alloy is produced by a specifically described method (examples, claims) then the method is classified as well ([C22F](#), [C21D](#), [B22F](#), [C23C](#), [B23K](#), [C25D](#), [C25B](#), [B22D](#), [B21J](#), [B21B](#), [B21C](#) etc).

When the alloy is intended for a particular use/product then the use/ product is classified as well.

## References

### Limiting references

*This place does not cover:*

Amorphous alloys	<a href="#">C22C 45/06</a>
Laminates	<a href="#">B32B</a>

### Informative references

*Attention is drawn to the following places, which may be of interest for search:*

Soldering/welding materials	<a href="#">B23K 35/00</a>
Changing the physical structure of beryllium or alloys based thereon	<a href="#">C22F 1/16</a>

## Special rules of classification

When the alloy contains less than 50 wt% of each constituent, with Be being a major constituent, then in addition [C22C 25/00](#) class at least one [C22C 30/00](#) class is also given depending on the rest of the main alloying elements.

The alloy composition(s) is/are indexed in the Alloys database.

## C22C 26/00

### Alloys containing diamond {or cubic or wurtzitic boron nitride, fullerenes or carbon nanotubes}

## References

### Limiting references

*This place does not cover:*

Laminates	<a href="#">B32B</a>
Diamond with silicon binder	<a href="#">C04B</a>

### Informative references

*Attention is drawn to the following places, which may be of interest for search:*

Preparation of diamond	<a href="#">B01J 3/06</a> , <a href="#">C01B 31/00</a>
Composite workpieces or articles	<a href="#">B22F 7/06</a>
Preparation of carbon nanosized materials - fullerenes - carbon nanotubes Preparation of graphite materials, incl. - graphene	<a href="#">C01B 31/0213</a> , <a href="#">C01B 31/022</a> , <a href="#">C01B 31/0438</a>

## Special rules of classification

In case there are other compounds present apart from the main compound, this additional information concerning the composition of the further compound will be given by an Indexing Code ;

fullerenes and carbon nanotubes are also indicated by means of an Indexing Code.

When the composition of a product is expressed in ranges and is the basis of the invention or when specific examples are given in the description, the composition, respectively the examples, should also be classified in the database Alloys. In case the composition is expressed in general terms or is not the basis of the invention, the composition is indexed by deep-indexing according to the scheme of [B22F](#) and in accordance with the rules presented in the annex.

## Synonyms and Keywords

*In patent documents, the following abbreviations are often used:*

PCD	PolyCrystalline Diamond
Fullerenes	buckyballs

## C22C 27/00

### Alloys based on rhenium or a refractory metal not mentioned in groups

[C22C 14/00](#) or [C22C 16/00](#)

### Definition statement

*This place covers:*

Rhenium or refractory metal based alloys other than Ti-, Zr- based alloys i.e. with Re, V, Cr, Nb, Mo, Hf, Ta, W as the major constituent i.e. the base of the alloy.

### Relationships with other classification places

When the alloy is produced by a specifically described method (examples, claims) then the method is classified as well ([C22F](#), [C21D](#), [B22F](#), [C23C](#), [B23K](#), [C25D](#), [C25B](#), [B22D](#), [B21J](#), [B21B](#), [B21C](#) etc).

When the alloy is intended for a particular use/product then the use/ product is classified as well.

## References

### Limiting references

*This place does not cover:*

Amorphous alloys	<a href="#">C22C 45/00</a> , <a href="#">C22C 45/006</a> , <a href="#">C22C 45/10</a>
Laminates	<a href="#">B32B</a>
Magnetic media/MRAM/head laminates	<a href="#">G11B</a> , <a href="#">G11C</a>

### Informative references

*Attention is drawn to the following places, which may be of interest for search:*

Soldering/welding materials	<a href="#">B23K 35/00</a>
Changing the physical structure of Re,V, Cr, Nb, Mo, Hf, Ta, W or alloys based thereon	<a href="#">C22F 1/18</a>

## Special rules of classification

In these groups, the last place rule is followed combined with multiple classifications. Depending on the base of the alloy the appropriate [C22C 27/00](#) class is given.

Vanadium based alloys are classified in [C22C 27/025](#).

Niobium, tantalum based alloys are classified in [C22C 27/02](#).

Alloys based on Re, Hf are classified in [C22C 27/00](#).

When the alloy contains less than 50 wt% of each constituent, with Re, V, Cr, Nb, Mo, Hf, Ta, W being a major constituent, then in addition to the corresponding [C22C 27/00](#) class at least one [C22C 30/00](#) class is also given depending on the rest of the main alloying elements.

The alloy composition(s) is/are indexed in the Alloys database.

## C22C 28/00

**Alloys based on a metal not provided for in groups [C22C 5/00](#) - [C22C 27/00](#)**

### Definition statement

*This place covers:*

alloys not otherwise provided for, such as alloys based on Ga, Ge, In, Rare earth metals etc.

### Relationships with other classification places

When the alloy is produced by a specifically described method (examples, claims) then the method is classified as well ([C22F](#), [C21D](#), [B22F](#), [C23C](#), [B23K](#), [C25D](#), [C25B](#), [B22D](#), [B21J](#), [B21B](#), [B21C](#) etc).

When the alloy is intended for a particular use/product then the use/ product is classified as well.

### References

#### Limiting references

*This place does not cover:*

Amorphous alloys	<a href="#">C22C 45/00</a>
Laminates	<a href="#">B32B</a>
Alloys based on non-metals (such as B, Si, Se, Te-based alloys)	<a href="#">C01B</a> , <a href="#">C01D</a> , <a href="#">C01G</a>

#### Informative references

*Attention is drawn to the following places, which may be of interest for search:*

Soldering/welding materials	<a href="#">B23K 35/00</a>
Changing the physical structure of non-ferrous metals and non-ferrous alloys	<a href="#">C22F</a>

## Special rules of classification

When the alloy contains less than 50 wt% of each constituent, then in addition to [C22C 28/00](#) class at least one [C22C 30/00](#) class is also given depending on the rest of the main alloying elements.

The alloy composition(s) is/are indexed in the Alloys database.

## C22C 29/00

**Alloys based on carbides, oxides, nitrides, borides, or silicides, e.g. cermets, or other metal compounds, e.g. oxynitrides, sulfides {(C22C 26/00 takes precedence)}**

### Definition statement

*This place covers:*

alloys containing more than 50wt% of carbides, oxides, nitrides, borides, oxynitrides, sulfides etc., i.e. cermets

### References

#### Limiting references

*This place does not cover:*

Cubic or wurtzitic boron nitrides	<a href="#">C22C 26/00</a>
Laminates	<a href="#">B32B</a>
Magnetic media/head laminates	<a href="#">G11B</a>

#### Informative references

*Attention is drawn to the following places, which may be of interest for search:*

Dry process for making cermets	<a href="#">C22C 1/05</a>
Non-ferrous alloys containing at least 5wt% but less than 50wt% of carbides, oxides, nitrides, borides, oxynitrides, sulfides etc.	<a href="#">C22C 32/00</a>
Ferrous alloys obtained by powder metallurgy with more than 5wt% of carbides, nitrides or borides	<a href="#">C22C 33/0292</a>
Welding material	<a href="#">B23K 35/327</a>
Spray coating material	<a href="#">C23C 4/06</a>

### Special rules of classification

Depending on the composition of either the matrix or the main metallic or non-metallic compound, the composition is classified in one of the subgroups of [C22C 29/00](#).

When the composition of a product is expressed in ranges and is the basis of the invention or when specific examples are given in the description, the composition, respectively the examples, should also be classified in the database Alloys. When the composition is expressed in general terms or is not the basis of the invention, the composition is indexed by deep-indexing according to the scheme of [B22F](#) and in accordance with the rules presented in the annex.

### Synonyms and Keywords

*In patent documents, the following abbreviations are often used:*

Cermet	mmc, metal ceramic matrix
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## C22C 30/00

### Alloys containing less than 50% by weight of each constituent

#### Definition statement

*This place covers:*

Alloys of multiple bases, i.e. with more than one element as major constituents.

#### Relationships with other classification places

When the alloy is produced by a specifically described method (examples, claims) then the method is classified as well ([C22F](#), [C21D](#), [B22F](#), [C23C](#), [B23K](#), [C25D](#), [C25B](#), [B22D](#), [B21J](#), [B21B](#), [B21C](#) etc).

When the alloy is intended for a particular use/product then the use/ product is classified as well.

#### References

##### Limiting references

*This place does not cover:*

Amorphous alloys	<a href="#">C22C 45/00</a>
Laminates	<a href="#">B32B</a>
Magnetic media/ head laminates	<a href="#">G11B</a>

##### Informative references

*Attention is drawn to the following places, which may be of interest for search:*

Powder metallurgy	<a href="#">B22F</a>
Soldering/welding materials	<a href="#">B23K 35/00</a>
Changing the physical structure of ferrous alloys	<a href="#">C21D</a>
Coatings, sputtering targets	<a href="#">C23C</a>
Magnets	<a href="#">H01F</a>

#### Special rules of classification

In these groups, the last place rule is followed combined with multiple classifications. Depending on whether the alloy contains Cu, Sn, Pb, Zn the corresponding [C22C 30/00](#) class is given. When the alloy comprises more than one of Cu, Sn, Pb, Zn, more than one [C22C 30/00](#) are given.

For example an alloy consisting of 40 wt% Cu, 40 wt% Sn and 20% Zn is classified in [C22C 30/02](#), [C22C 30/04](#), [C22C 30/06](#).

In addition to the corresponding [C22C 30/00](#) class other [C22C](#) classes may also be given based on the specific embodiments.

The alloy composition(s) is/are indexed in the Alloys database.

## C22C 32/00

**Non-ferrous alloys containing at least 5% by weight but less than 50% by weight of oxides, carbides, borides, nitrides, silicides or other metal compounds, e.g. oxynitrides, sulfides whether added as such or formed in situ**

### Definition statement

*This place covers:*

also dispersion hardened alloys with less than 5wt% of dispersed compounds, e.g. ODS aluminum

### References

#### Limiting references

*This place does not cover:*

Alloys containing cubic or wurtzitic Boron Nitrides, diamonds	<a href="#">C22C 26/00</a>
Ferrous alloys (by powder metallurgy)	<a href="#">C22C 33/00</a> , ( <a href="#">C22C 33/02</a> )
Laminates	<a href="#">B32B</a>

#### Informative references

*Attention is drawn to the following places, which may be of interest for search:*

Resin bonded metal powders or metal carbides or the like	<a href="#">B29K 2303/06</a>
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### Special rules of classification

Depending on the composition of the main metallic or non-metallic compound, the composition is classified in one of the subgroups of [C22C 32/00](#)

Exception: ODS steels (including those containing less than 5wt% Oxide Dispersions) are classified in [C22C 32/0026](#) when the oxide dispersions are the single non-metallic constituent,

ALL other ferrous alloys obtained by powder metallurgy and having metallic or non-metallic compounds therein are classified in [C22C 33/0214](#) - [C22C 33/0228](#) or [C22C 33/0292](#)

When a filler material can only be of a fibrous nature, classification is made in group [C22C 47/00](#), [C22C 49/00](#). When the filler material is chosen from alternatives which can be fibrous or non-fibrous, classification is made in group [C22C 1/10](#). When both fibrous and non-fibrous fillers are present, classification is made in group [C22C 47/00](#), [C22C 49/00](#) and also in group [C22C 32/00](#) if the composition is of importance.

When the composition of a product is expressed in ranges and is the basis of the invention or when specific examples are given in the description, the composition, respectively the examples, should also be classified in the database Alloys. When the composition is expressed in general terms or is not the basis of the invention, the composition is indexed by deep-indexing according to the scheme of [B22F](#) and in accordance with the rules presented in the annex.

## C22C 33/00

### Making ferrous alloys

#### Definition statement

*This place covers:*

Methods of making ferrous alloys, cast irons, amorphous ferrous alloys not provided in any of [C21D](#), [C22B](#), [C21B](#). Use of master alloys for the production of ferrous alloys.

#### Relationships with other classification places

The compositions of the amorphous alloys are classified in [C22C 45/00](#).

The methods of making amorphous alloys (other than Fe-based ones) are classified in [C22C 1/002](#).

Methods of changing the physical structure of ferrous alloys are classified in [C21D](#).

The cast iron compositions are classified in [C22C 37/00](#).

Master alloy compositions are classified in [C22C 35/00](#).

When the alloy is intended for a particular use/product then the use/ product is classified as well.

#### References

##### Limiting references

*This place does not cover:*

Powder metallurgy methods	<a href="#">C22C 33/02</a> , <a href="#">B22F</a>
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##### Informative references

*Attention is drawn to the following places, which may be of interest for search:*

Changing the physical structure of ferrous alloys	<a href="#">C21D</a>
Refining of metals	<a href="#">C22B</a>

#### Special rules of classification

In these groups, the last place rule is followed combined with multiple classifications.

## C22C 33/02

### by powder metallurgy (working metallic powder [B22F](#))

#### References

##### Informative references

*Attention is drawn to the following places, which may be of interest for search:*

Chemical treatment of metallic powders (incl. decarburising)	<a href="#">B22F 1/0088</a>
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#### Special rules of classification

Iron or steel alloys containing metal or non-metallic compounds are classified as follows:

- ODS steels: [C22C 32/0026](#)

- containing more than 5wt% carbides, nitrides or borides (NOT BN) : [C22C 33/0292](#)
- containing phosphor compounds: [C22C 33/0214](#)
- containing sulphur compounds: [C22C 33/0221](#)
- containing other compounds, incl. Boron Nitrides and less than 5wt% carbides, nitrides or borides, or more than 5wt% graphite: [C22C 33/0228](#)

If less than 5wt% of graphite is present as essential feature then classify in [C22C 33/0228](#) nevertheless; if not index.

When the composition of a product is expressed in ranges and is the basis of the invention or when specific examples are given in the description, the composition, respectively the examples, should also be classified in the database Alloys. When the composition is expressed in general terms or is not the basis of the invention, the composition is indexed by deep-indexing according to the scheme of [B22F](#) and in accordance with the rules presented in the annex.

## C22C 35/00

### Master alloys for iron or steel

#### Definition statement

*This place covers:*

Master alloys used for the production of iron/steel

#### Relationships with other classification places

Ferrous alloys, steels are classified in [C22C 38/00](#).

The cast iron compositions are classified in [C22C 37/00](#).

Methods of changing the physical structure of ferrous alloys are classified in [C21D](#).

Making ferrous alloys by melting using master alloys is classified in [C22C 33/06](#).

#### References

##### Limiting references

*This place does not cover:*

Making ferrous alloys	<a href="#">C22C 33/00</a>
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##### Informative references

*Attention is drawn to the following places, which may be of interest for search:*

Powder metallurgy	<a href="#">B22F</a>
Changing the physical structure of ferrous alloys	<a href="#">C21D</a>
Refining of metals	<a href="#">C22B</a>

#### Special rules of classification

Fe-based master alloys are classified in [C22C 35/005](#).

The master alloy compositions are indexed in the Alloys database.

## C22C 37/00

### Cast-iron alloys

#### Definition statement

*This place covers:*

Cast iron alloy compositions

#### Relationships with other classification places

Making cast iron alloys [C22C 33/08](#) – [C22C 33/12](#).

#### References

##### Limiting references

*This place does not cover:*

Steel alloy compositions	<a href="#">C22C 38/00</a>
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##### Informative references

*Attention is drawn to the following places, which may be of interest for search:*

Making cast iron alloys	<a href="#">C22C 33/08</a> – <a href="#">C22C 33/12</a>
Changing the physical structure of ferrous alloys	<a href="#">C21D</a>
Refining of metals	<a href="#">C22B</a>

#### Special rules of classification

If the cast iron contains spheroidal, nodular graphite, then it is classified in [C22C 37/04](#).

In these groups, the last place rule is followed combined with multiple classifications. Depending on whether the cast iron contains Cr, Al or Si, the corresponding [C22C 37/00](#) classes are given.

When a cast iron contains spheroidal graphite as well as Cr, Ni and Si the classes [C22C 37/04](#), [C22C 37/08](#) and [C22C 37/10](#) are given.

The alloy composition(s) is/are indexed in the Alloys database.

## C22C 38/00

### Ferrous alloys, e.g. steel alloys (cast-iron alloys [C22C 37/00](#))

#### Definition statement

*This place covers:*

Iron based alloys and all types of steels (low alloy steels, dual-phase steels, tool steels, spring steels, maraging steels, stainless steels, ferritic, austenitic, martensitic, bainitic, pearlitic etc.).

#### Relationships with other classification places

Cast iron compositions are classified in [C22C 37/00](#).

Fe-based amorphous alloys are classified in [C22C 45/02](#).

Methods of changing the physical structure of ferrous alloys are classified in [C21D](#).

When the alloy is produced by a specifically described method (examples, claims) then the method is classified as well ([C22F](#), [C21D](#), [B22F](#), [C23C](#), [B23K](#), [C25D](#), [C25B](#), [B22D](#), [B21J](#), [B21B](#), [B21C](#) etc).

When the alloy is intended for a particular use/product then the use/ product is classified as well.

## References

### Limiting references

*This place does not cover:*

Cast irons	<a href="#">C22C 37/00</a>
Amorphous alloys	<a href="#">C22C 45/02</a> , <a href="#">C22C 45/008</a>

### Informative references

*Attention is drawn to the following places, which may be of interest for search:*

Soldering/welding materials	<a href="#">B23K 35/3053</a> - <a href="#">B23K 35/3093</a>
Layered products	<a href="#">B32B</a>
Changing the physical structure of ferrous alloys	<a href="#">C21D</a>

## Special rules of classification

In these groups, the last place rule is followed combined with multiple classifications.

Ferrous alloys/steels containing Cr (and no Ni) are classified in [C22C 38/18-C22C 38/38](#). It is noted that depending on the alloying elements present in the composition the classes [C22C 1/002-C22C 16/00](#), [C22C 38/60](#) may also be given in addition to the ones of [C22C 38/18-C22C 38/38](#).

Ferrous alloys/steels containing Cr and Ni are classified in [C22C 38/40-C22C 38/58](#). It is noted that depending on the alloying elements present in the composition the classes [C22C 1/002 -C22C 16/00](#), [C22C 38/60](#) may also be given in addition to the ones of [C22C 38/40-C22C 38/58](#)

Due to lack of IPC entry, Steels/Ferrous alloys containing Cr with Ni with more than 1.5 wt% of Si are classified at [C22C 38/34](#), i.e. using the class for Steels/Ferrous alloys containing Cr with more than 1.5 wt% of Si.

For example a stainless steel consisting of by mass %, C: 0.03-0.12%, Si: 0.1-1%, Mn: 0.1-2%, Cr: 20% to 28%, Ni: 15-35%, W: 4-10%, Ti: 0.01-0.3%, Nb: 0.01-1%, sol. Al: 0.0005-0.04%, B: 0.0005-0.01%, REM 0.0005-0.2% and the balance Fe and impurities; is classified in:

[C22C 38/02](#); [C22C 38/04](#); [C22C 38/58](#); [C22C 38/44](#); [C22C 38/50](#); [C22C 38/48](#); [C22C 38/005](#); [C22C 38/54](#).

When that the ferrous alloy/steel contains Cr, whereas Ni is being optionally added, then if specific examples exist with Cr without Ni as well as with Cr and Ni, the composition is classified in both in [C22C 38/18-C22C 38/38](#) and [C22C 38/40-C22C 38/58](#).

In the class [C22C 38/004](#) are classified very low carbon steels i.e. with carbon content less than 0.01 wt%, when: a) the carbon range discloses a specific low limit being less than 0.01 wt% or b) the examples disclose carbon contents less than 0.01 wt%. Specific disclosures therefore such as C 0.0001- 0.0050 wt% (or 1-50 ppm) are classified in [C22C 38/004](#). General disclosures however such as C 0-0.03 wt% not accompanied by specific carbon contents less than 0.01 wt% are not classified in [C22C 38/004](#).

In the class [C22C 38/002](#) are classified ferrous alloy/steel which contain elements for which no entry is provided in the groups [C22C 38/001](#), [C22C 38/004](#)-**C22C30/60**, such as P, In, Mg, precious metals etc.

It is noted that class [C22C 38/60](#) is an one dot entry.

When the alloy contains less than 50 wt% of each constituent, with Fe being a major constituent, then in addition to the corresponding [C22C 38/00](#) class at least one [C22C 30/00](#) class is also given depending on the rest of the main alloying elements.

The ferrous alloy/steel composition(s) is/are indexed in the Alloys database.

## C22C 43/00

### Alloys containing radioactive materials

#### Definition statement

*This place covers:*

alloys which are radioactive or contain an element with radioactive isotopes, e.g. uranium, promethium, technetium etc.

#### Relationships with other classification places

When the alloy is produced by a specifically described method (examples, claims) then the method is classified as well ([C22F](#), [C21D](#), [B22F](#), [C23C](#), [B23K](#), [C25D](#), [C25B](#), [B22D](#), [B21J](#), [B21B](#), [B21C](#) etc).

When the alloy is intended for a particular use/product then the use/ product is classified as well.

#### References

##### Limiting references

*This place does not cover:*

Amorphous alloys	<a href="#">C22C 45/00</a>
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##### Informative references

*Attention is drawn to the following places, which may be of interest for search:*

Nuclear reactors/reactor fuel elements	<a href="#">G21C</a> , <a href="#">G21C 3/07</a>
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#### Special rules of classification

When the alloy contains less than 50 wt% of each constituent, then in addition to [C22C 43/00](#) class at least one [C22C 30/00](#) class is also given depending on the rest of the main alloying elements.

The alloy composition(s) is/are indexed in the Alloys database.

## C22C 45/00

### Amorphous alloys

#### Definition statement

*This place covers:*

amorphous alloys, metallic glasses

## Relationships with other classification places

The methods of making Fe-based amorphous alloys are classified in [C22C 33/003](#).

The methods of making amorphous alloys (other than Fe-based ones) are classified in [C22C 1/002](#).

Semi-amorphous alloys are classified both as amorphous and as crystalline ones having a corresponding [C22C 45/00](#) class and [C22C 5/00-C22C 38/00](#) classes.

When the alloy is intended for a particular use/product then the use/product is classified as well.

## References

### Limiting references

*This place does not cover:*

Crystalline alloy compositions	<a href="#">C22C</a>
Ceramics	<a href="#">C04B</a>

### Informative references

*Attention is drawn to the following places, which may be of interest for search:*

Powder metallurgy	<a href="#">B22F</a>
Soldering/welding materials	<a href="#">B23K 35/00</a>
Changing the physical structure of ferrous alloys	<a href="#">C21D</a>
Changing the physical structure of non ferrous alloys	<a href="#">C22F</a>
Coatings	<a href="#">C23C</a>

## Special rules of classification

In these groups, the last place rule is followed combined with multiple classifications. Therefore, depending on the major constituent i.e. the base of the alloy the corresponding [C22C 45/00](#) class is given.

Fe-based amorphous alloys are classified in [C22C 45/02](#).

Ni or Co-based amorphous alloys are classified in [C22C 45/04](#).

Amorphous alloys with a major constituent which is not disclosed in any of [C22C 45/001-C22C 45/10](#) classes are classified in the [C22C 45/00](#).

The amorphous alloy composition(s) is/are indexed in the Alloys database